NETEXT WG
Internet-Draft
Intended status: Standards Track
Expires: October 25, 2012

S. Gundavelli
Cisco

April 23, 2012

Applicability of Proxy Mobile IPv6 Protocol for WLAN Access Networks
draft-gundavelli-netext-pmipv6-wlan-applicability-03.txt

Abstract

Proxy Mobile IPv6 is a network-based mobility management protocol. The protocol is designed for providing mobility management support to a mobile node, without requiring its participation in any IP mobility related signaling. The base protocol is defined in an access technology independent manner, it identifies the general requirements from the link-layer for supporting the protocol operation. However, it does not provide any specific details on how it can be supported on a specific access technology. This specification identifies the key considerations for supporting Proxy Mobile IPv6 protocol on the widely deployed wireless LAN access architectures, based on IEEE 802.11 standards. It explores the current dominant wireless LAN deployment models and provides the needed interworking details.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at http://datatracker.ietf.org/drafts/current/.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on October 25, 2012.

Table of Contents

1. Introduction

Proxy Mobile IPv6 is a network-based mobility management protocol specified in [RFC5213]. The protocol can be used for providing mobility management support to a mobile node within a localized domain, without requiring its participation in any IP mobility related signaling.

The core functional entities in the Proxy Mobile IPv6 domain are the local mobility anchor (LMA) and the mobile access gateway (MAG). The local mobility anchor is responsible for maintaining the mobile node's reachability state and is the topological anchor point for the mobile node's home network. The mobile access gateway is the entity that performs the mobility management on behalf of a mobile node, and it resides on the access link where the mobile node is anchored. The mobile access gateway is responsible for detecting the mobile node's movements to and from the access link and for initiating binding registrations to the mobile node's local mobility anchor.

There are numerous protocol extensions defined to Proxy Mobile IPv6 protocol, for supporting various features. These features include support for IPv4 transport and addressing support [RFC5844], GRE Key negotiation support [RFC5845], Binding Revocation support [RFC5846]. Diameter support [RFC5779], RADIUS support [I-D.draft-ietf-netext-radius-pmip6] and Proxy Mobile IPv6 MIB [I-D.draft-ietf-netlmm-pmipv6-mib]. All of these features give the protocol a completeness for being adopted as a network-based mobility management protocol within a micro-mobility domains, based on WLAN access architectures.

This specification identifies the key considerations for supporting Proxy Mobile IPv6 protocol in micro-mobility domains, such as in wireless LAN access architectures, based on IEEE 802.11 standards.

2. Conventions & Terminology

2.1. Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

2.2. Terminology

All the mobility related terms used in this document are to be interpreted as defined in the Proxy Mobile IPv6 specifications [RFC5213], [RFC5844], [RFC5845] and [RFC5846]. Additionally, this document uses the following abbreviations:

- WLAN (Wireless Local Area Network) - A wireless network.

- WTP (Wireless Termination Point): The entity that functions as the termination point for the network-end of the IEEE 802.11 based air interface from the mobile node. It is also knows as the Wireless Access Point.

- WLC (Wireless LAN Controller): The entity that provides the centralized forwarding, routing function for the user traffic. All the user traffic from the mobile nodes attached to the WTP's is typically tunneled to this centralized WLAN access controller.

3. Overview

3.1. Deployment Models

This section identifies the most common deployment models in the wireless LAN architectures and identifies the functional collocation points for the Proxy Mobile IPv6 functional elements.

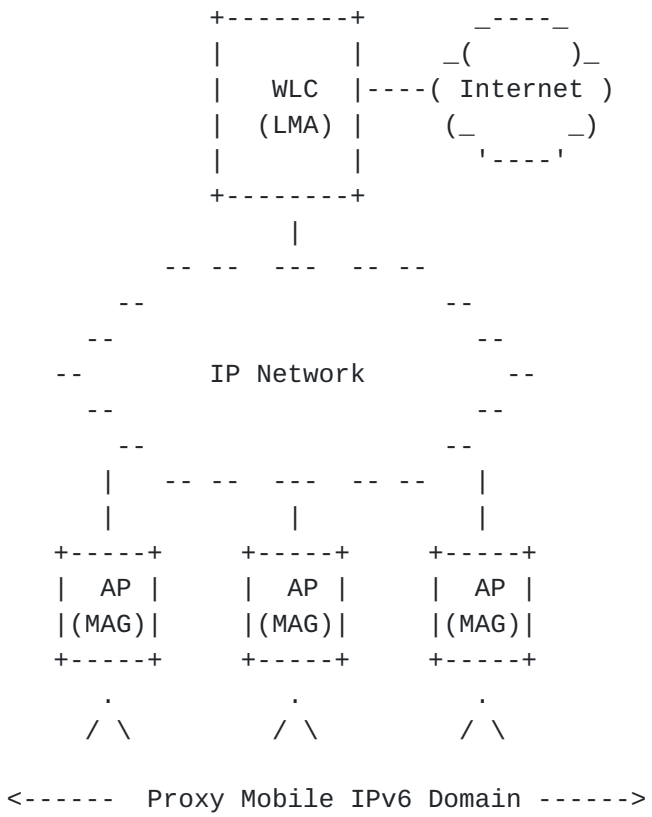

Figure 1: Collocated MAG and WTP Functions

Figure 1, illustrates the scenario where the MAG [RFC5213] is collocated with the access point. The access point is a layer-3 device and is also the wireless termination point (WTP). The local mobility anchor [RFC5213] is collocated with the wireless LAN controller.

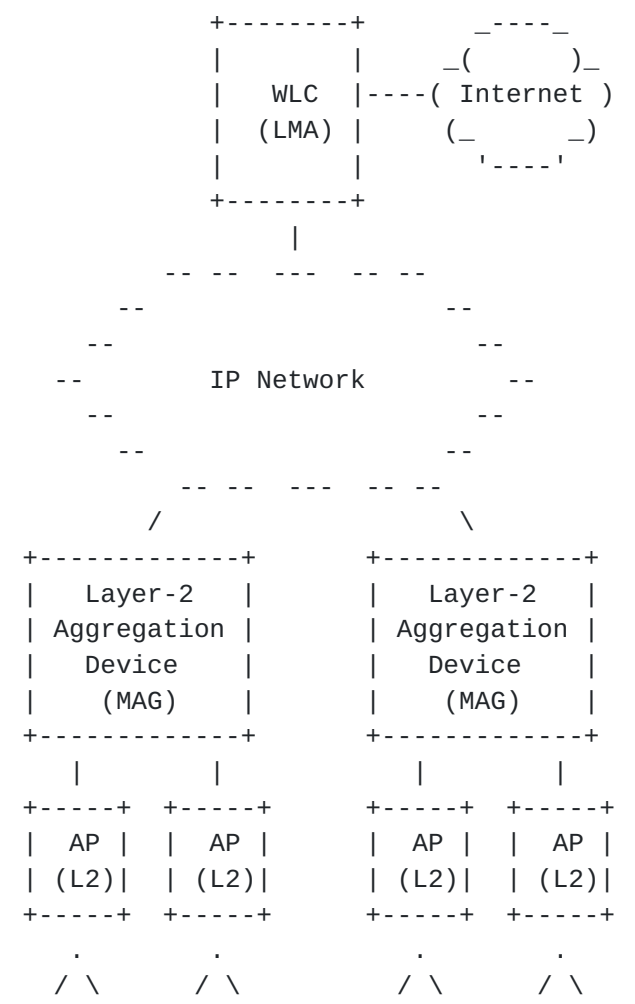

Figure 2: Collocated MAG with the layer-2 aggregation device

Figure 2, illustrates the scenario where the MAG [RFC5213] is collocated with the layer-2 aggregation device. The access point in this model is a layer-2 device and is also the wireless termination point (WTP). The local mobility anchor [RFC5213] is collocated with the wireless LAN controller.

3.2. Key Considerations

Wireless LAN architectures have evolved from single autonomous access points to systems consisting of a centralized wireless LAN Controller and access points. In today's deployments, the wireless LAN controller and the access points are configured to perform certain manageability (Ex: CAPWAP) related functions. For enabling network-based mobility management in these architectures, based on Proxy

Mobile IPv6, these network elements must apply the following considerations.

- The local mobility anchor [RFC5213] function can be collocated on any access edge device, such as an access controller. This access controller in in some deployments can be configured to host both the mobility management and other provisioning functions (as specified in CAPWAP specifications, [RFC5415] and [RFC5415]). In some deployments, these functions can be non-collocated).

- If the access point is configured to operate as an IP router (layer-3 device), with IP forwarding enabled between the wireless and wired links, the mobile access gateway [RFC5213] function can be collocated on the access point.

- If the access point is configured to operate as a bridge (layer-2 device), with layer-2 bridging enabled between the wireless and wired links, the mobile access gateway [RFC5213] function can be collocated on the aggregation device terminating the layer-2 devices.

- The mobile access gateway when sending the Proxy Binding Update message MUST identify the access technology type, it MUST include the Access Technology Type [RFC5213] option, and the value in the option MUST be set to (4) (IEEE 802.11a/b/g).

- The All the network entities in a Proxy Mobile IPv6 domain MUST be able to identify a mobile node, using its MN-Identifier [RFC5213]. This identifier MUST be stable and unique across the Proxy Mobile IPv6 domain. The mobility entities in the Proxy Mobile IPv6 domain MUST be able to use this identifier in the signaling messages and unambiguously identify a given mobile node. The mobile access MUST learn this identifier from the access authentication mechanisms as specified in [draft-liebsch-netext-pmip6-authiwk].

- The Proxy Mobile IPv6 protocol is designed to support a Per-MN-Prefix [RFC5213] model. In this model, each mobile node is assigned a set of unique IPv6 prefixes which are not shared with any other node. The mobile access gateway ensures, the Router Advertisement [RFC4861] messages that a mobile node receives contains its own set of IPv6 prefixes. In access networks where the link between the mobile node and the mobile access is a point-to-point link, supporting this semantic does not require any special considerations. However, on IEEE 802.11 based access links, which is a shared link, the mobile access gateway MUST transmit the multicast messages as unicast messages on the link-layer. This approach is specified in

[I-D.draft-gundavelli-v6ops-l2-unicast].

4. IANA Considerations

This specification does not require any IANA actions.

5. Security Considerations

All the security considerations from the base Proxy Mobile IPv6 specifications, [RFC5213] and [RFC5844], apply equally well to Proxy Mobile IPv6 domains supporting IEEE 802.11-based access networks. The support for IEEE 802.11-based access networks does not require any new security considerations and does not introduce any new security vulnerabilities known at this time.

6. Acknowledgements

The author of this document thanks the members of the NETLMM working group for all the discussions related to this topic.

7. References

7.1. Normative References

[I-D.ietf-netlmm-pmipv6-mib]
Mansfield, G., Koide, K., Gundavelli, S., and R. Wakikawa, "Proxy Mobile IPv6 Management Information Base", draft-ietf-netlmm-pmipv6-mib-08 (work in progress), October 2011.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC5213] Gundavelli, S., Leung, K., Devarapalli, V., Chowdhury, K., and B. Patil, "Proxy Mobile IPv6", RFC 5213, August 2008.

[RFC5779] Korhonen, J., Bournelle, J., Chowdhury, K., Muhanna, A., and U. Meyer, "Diameter Proxy Mobile IPv6: Mobile Access Gateway and Local Mobility Anchor Interaction with Diameter Server", RFC 5779, February 2010.

[RFC5844] Wakikawa, R. and S. Gundavelli, "IPv4 Support for Proxy Mobile IPv6", RFC 5844, May 2010.

[RFC6085] Gundavelli, S., Townsley, M., Troan, O., and W. Dec, "Address Mapping of IPv6 Multicast Packets on Ethernet", RFC 6085, January 2011.

7.2. Informative References

[I-D.liebsch-netext-pmip6-authiwk]
Liebsch, M., Seite, P., and S. Gundavelli, "PMIPv6 inter-working with WiFi access authentication", draft-liebsch-netext-pmip6-authiwk-03 (work in progress), October 2011.

[RFC4861] Narten, T., Nordmark, E., Simpson, W., and H. Soliman, "Neighbor Discovery for IP version 6 (IPv6)", RFC 4861, September 2007.

[RFC5415] Calhoun, P., Montemurro, M., and D. Stanley, "Control And Provisioning of Wireless Access Points (CAPWAP) Protocol Specification", RFC 5415, March 2009.

[RFC5845] Muhanna, A., Khalil, M., Gundavelli, S., and K. Leung, "Generic Routing Encapsulation (GRE) Key Option for Proxy Mobile IPv6", RFC 5845, June 2010.

[RFC5846] Muhanna, A., Khalil, M., Gundavelli, S., Chowdhury, K., and P. Yegani, "Binding Revocation for IPv6 Mobility", RFC 5846, June 2010.

[RFC6224] Schmidt, T., Waehlisch, M., and S. Krishnan, "Base Deployment for Multicast Listener Support in Proxy Mobile IPv6 (PMIPv6) Domains", RFC 6224, April 2011.

Author's Address

Sri Gundavelli
Cisco
170 West Tasman Drive
San Jose, CA 95134
USA

Email: sgundave@cisco.com